

here, that current demand would not take into account growth. To the contrary, the Commission found that current demand accounts for growth.<sup>649</sup>

248. In addition, because AT&T/WorldCom and Verizon use distinct types of fill factors in their respective models (target fill versus realized fill), the factors used in one model may not be directly substituted into the other model. This is one of the few matters on which AT&T/WorldCom and Verizon agree.<sup>650</sup> Indeed, one Verizon witness, agreeing with an AT&T/WorldCom witness, stated that “there is not a really direct way to know the comparison between our [Verizon’s] fill factor and theirs [AT&T/WorldCom’s]. . . . It’s really a totally different use of the utilization [*i.e.*, fill] factor.”<sup>651</sup>

249. Further, in its brief, Verizon defends the use of actual fill factors on the ground that the average fill factor in the competitive environment assumed under the Commission’s TELRIC rules would be less than its current actual fill due to increased fluctuations in demand and customer churn.<sup>652</sup> Although there may be some merit to Verizon’s argument that competition will lead to greater fluctuations in demand, it also may be the case that companies in a competitive market would develop more efficient mechanisms to respond to these fluctuations (*e.g.*, more creative marketing and pricing strategies, more flexible network architectures). Because Verizon has presented no evidence on this point, we have no basis for finding that there is a negative correlation between competition and outside plant utilization rates.<sup>653</sup>

## (ii) Distribution Fill Factor

### (a) Positions of the Parties

250. In the MSM, AT&T/WorldCom use target fill factors for distribution cable of between 50 and 75 percent, with an effective fill averaged across density zones of 52.5 percent.<sup>654</sup> These target fills are the same fill factors that the Commission adopted in the *Inputs Order*.<sup>655</sup> To determine the effective fill factor using current demand (as AT&T/WorldCom project it), AT&T/WorldCom perform a test using mid-2001 data for total demand. Specifically, they compute an effective fill factor by comparing the number of cable pairs actually deployed by the model with

<sup>649</sup> *Id.* at 20243-44, para. 201 (“Significantly, we note that, contrary to GTE’s inference, current demand as we define it includes an amount of excess capacity to accommodate short-term growth.”).

<sup>650</sup> Tr. at 4494-96.

<sup>651</sup> *Id.*

<sup>652</sup> See Verizon Initial Cost Brief at 105.

<sup>653</sup> The effect of increases in risk due to demand fluctuations and churn may be reflected in the cost of capital. See *supra* section III(C).

<sup>654</sup> AT&T/WorldCom Ex. 14, at 13-14; AT&T/WorldCom Initial Cost Brief at 151.

<sup>655</sup> *Inputs Order*, 14 FCC Rcd at 20369, App. A.

the demand number in the model.<sup>656</sup>

251. Verizon claims that AT&T/WorldCom's proposed fill factors would not enable a carrier to operate efficiently and meet minimum service quality standards.<sup>657</sup> Rather, normal network planning requires building two lines to each customer premises to serve ultimate demand.<sup>658</sup> Verizon asserts that although the Commission previously supported use of current, rather than ultimate, demand, this was in the universal service context.<sup>659</sup> By building only to current demand, Verizon contends that AT&T/WorldCom fail to account for demand fluctuations, churn, and administrative functions. Building to ultimate demand also avoids the future costs of inefficient piecemeal deployment.<sup>660</sup> Further, Verizon notes that AT&T/WorldCom's use of 2001 demand data to determine the effective fill factor is inconsistent with other aspects of the MSM that use mid-2002 demand data.<sup>661</sup>

252. Although Verizon criticizes modeling based on current demand rather than ultimate demand, AT&T/WorldCom note that Verizon does not propose an alternative figure (other than that Verizon uses in its own study) for use in the MSM.<sup>662</sup> Nor does Verizon provide any substantiation for its claim that a network built using AT&T/WorldCom's distribution fill factors would have insufficient capacity to function properly. AT&T/WorldCom claim, however, that their proposed fill factors are consistent with GTE engineering guidelines.<sup>663</sup> Verizon further failed to recognize that current demand includes capacity for short term growth, churn, and administrative functions.<sup>664</sup>

253. Finally, AT&T/WorldCom assert that Verizon's claim of a data mismatch between their effective fill factor calculations and their line count data is misplaced. To calculate fill factors, the same point in time must be used for both total available lines and total current lines. AT&T/WorldCom use mid-2001 data for both data points in their effective fill factor test calculation. Using 2002 data for only the numerator (*i.e.*, usable capacity) would improperly inflate

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<sup>656</sup> See AT&T/WorldCom Ex. 14, at 14 n.16.

<sup>657</sup> Verizon Ex. 109, at 22, 84-85; Verizon Initial Cost Brief at 160.

<sup>658</sup> Verizon Ex. 109, at 85.

<sup>659</sup> *Id.* at 84.

<sup>660</sup> *Id.* at 22, 84-86.

<sup>661</sup> Verizon Initial Cost Brief at 161; *see also* Verizon Ex. 108, at 31.

<sup>662</sup> AT&T/WorldCom Initial Cost Brief at 151.

<sup>663</sup> AT&T/WorldCom Initial Cost Brief Proprietary at 153 (confidential version) (citing AT&T Ex. 117P (GTE Network Planning: Planning Analysis Report, Infrastructure Provisioning Guidelines, PAR-074, Revision 1 (March 1997)), at H1-H3 (confidential version)).

<sup>664</sup> AT&T/WorldCom Ex. 1, at 13-14; *see also* AT&T/WorldCom Initial Cost Brief at 151-152; AT&T/WorldCom Reply Cost Brief at 66-67.

the calculated effective fill factor, contrary to Verizon's proposal of low fill factors, and would create a data mismatch within the fill factor calculation itself.<sup>665</sup>

**(b) Discussion**

254. We agree with AT&T/WorldCom and will use their proposed loop distribution fill factors. In the *Inputs Order*, the Commission expressly rejected using ultimate demand, as Verizon proposed then and proposes again now, in favor of using current demand to calculate fill factors.<sup>666</sup> There, the Commission found forecasting ultimate demand too speculative.<sup>667</sup> Here, Verizon fails to respond to this concern and provide a method of reliably forecasting ultimate demand, particularly in light of rapidly changing technological developments. Just as the Commission found it inappropriate to include in universal service support the costs of building outside plant designed to meet uncertain ten- or twenty-year demand projections, it is inappropriate for AT&T/WorldCom to bear the cost today of building plant for uncertain ultimate demand.<sup>668</sup> Verizon, moreover, continues to misinterpret current demand. As AT&T/WorldCom explain, the Commission previously found that current demand, *by definition*, includes capacity for growth.<sup>669</sup> Further, Verizon's assertion that AT&T/WorldCom's proposed fill factors are too high is belied by the information in GTE's engineering guidelines.<sup>670</sup>

255. Verizon also incorrectly criticizes AT&T/WorldCom's use of 2001 data instead of 2002 data for total demand in their test determination of the effective fill factor. AT&T/WorldCom propose using 2001 data for both total usable capacity and total demand, thereby ensuring consistency between the numerator and the denominator in calculating the distribution fill factor. Verizon's suggestion would artificially inflate the fill factor, as AT&T/WorldCom point out, and we think it unlikely that Verizon supports a higher fill factor. Consistency is crucial to the calculation of the fill factor, and Verizon provides no good reason to depart from the use of inputs of uniform vintage.<sup>671</sup>

256. Further, even if Verizon's criticisms were valid, Verizon failed to propose a viable

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<sup>665</sup> AT&T/WorldCom Ex. 14, at 13-14; *see also* AT&T/WorldCom Reply Cost Brief at 66 n.45.

<sup>666</sup> *Inputs Order*, 14 FCC Rcd at 20243-44, paras. 199-202.

<sup>667</sup> *Id.* at 20243-44, paras. 200-01.

<sup>668</sup> *See id.* at 20243, para. 199; AT&T/WorldCom Ex. 20, at 38-41; AT&T/WorldCom Reply Cost Brief at 67.

<sup>669</sup> *Inputs Order*, 14 FCC Rcd at 20237-38, 20243-44, paras. 186, 201.

<sup>670</sup> *See* AT&T Ex. 117P, at H1-H3 (confidential version).

<sup>671</sup> *See* AT&T/WorldCom Ex. 14, at 14 n.15; AT&T/WorldCom Reply Cost Brief at 66 n.45; *see also supra* section IV(C)(2)(c)(iii) (discussing model consistency issues).

alternative distribution fill factor for use in the MSM.<sup>672</sup> Indeed, as Verizon's witness concedes, the fill factors that Verizon uses in its cost study cannot be directly substituted into the MSM.<sup>673</sup> The Verizon testimony and briefs, moreover, do not include any other proposal for the distribution fill factors that Verizon would use in the MSM.

**(iii) Copper Feeder Fill Factor**

**(a) Positions of the Parties**

257. AT&T/WorldCom propose copper feeder target fill factors in the range of 70 percent to 82.5 percent, with lower effective fills after breakage is taken into account.<sup>674</sup> These target fill factors are the same as those adopted by the Commission in the universal service proceeding.<sup>675</sup>

258. Verizon claims that AT&T/WorldCom's copper fill factors are unreasonably high. In particular, Verizon contends that they fail to account for the fifteen percent capacity necessary for administrative services and for three percent capacity necessary to accommodate annual growth.<sup>676</sup>

259. AT&T/WorldCom respond that their fill factor proposal properly reflects current demand, and that it would need little or no adjustment even if Verizon were correct that the copper feeder fill factor must accommodate fifteen percent spare capacity for administrative purposes and three percent annual growth.<sup>677</sup> That is, fill factors in the 70 to 82.5 percent range can already accommodate these amounts of spare capacity. AT&T/WorldCom also assert that their proposed fill factors are consistent with the information contained in GTE engineering guidelines.<sup>678</sup>

**(b) Discussion**

260. We agree with AT&T/WorldCom and will use their proposed copper feeder fill factors. The copper feeder fill factors that AT&T/WorldCom propose comport with those adopted

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<sup>672</sup> See Tr. at 4494-96 (the fill factor used in the Verizon model cannot be imported into the MSM); AT&T/WorldCom Initial Cost Brief at 145-46.

<sup>673</sup> See Tr. at 4494-96; see also *Massachusetts 271 Order*, 16 FCC Rcd at 9007, para. 39 (questioning the use of a low distribution fill factor without a state-specific explanation).

<sup>674</sup> Breakage refers to the fact that cable pairs come in discrete sized bundles. In order to provide capacity on a given route, it is necessary to choose a bundle of size greater than or equal to the current demand. For example, if bundles exist in sizes of 6 and 12, but not in intermediate sizes, then a 12-cable bundle must be used to provide capacity for 8 cable pairs.

<sup>675</sup> See *Inputs Order*, 14 FCC Rcd at 20246-47, para. 207.

<sup>676</sup> Verizon Ex. 109, at 87; Verizon Reply Cost Brief at 153.

<sup>677</sup> AT&T/WorldCom Initial Cost Brief at 157.

<sup>678</sup> AT&T/WorldCom Initial Cost Brief at 157-58 (citing AT&T Ex. 117P, at E1-E3 (confidential version)).

by the Commission in the universal service proceedings and with those in the GTE planning guidelines.<sup>679</sup> In the *Inputs Order*, the Commission found that the copper feeder fill factor it adopted, proposed by AT&T/WorldCom here, reflected the industry practice of sizing feeder cable to meet current demand, which included cable sufficient for growth.<sup>680</sup> Moreover, AT&T/WorldCom's copper fill factor, which can be as low as 70 percent, also appears to be low enough to accommodate the fifteen percent administrative spare and additional spare for growth that Verizon alleges is necessary. Finally, Verizon again fails to recognize that the target fill factors proposed by AT&T/WorldCom and based on current demand properly account for growth, as the Commission found in the *Inputs Order*.<sup>681</sup> Thus, Verizon's criticisms are misplaced.

**(iv) Fiber Feeder / Fiber Strand Fill Factor**

**(a) Positions of the Parties**

261. AT&T/WorldCom propose a fill factor for fiber feeder (*i.e.*, fiber strand) of 100 percent.<sup>682</sup> The Commission adopted this fill factor in the universal service proceeding.<sup>683</sup> Fiber feeder plant, AT&T/WorldCom explain, inherently includes spare capacity, and growth can be accommodated by upgrading the electronics on the ends of the fiber.<sup>684</sup>

262. Verizon claims that a 100 percent fill factor improperly ignores the fact that fiber normally is installed in 12-ribbon strands, and that all strands in a ribbon are not necessarily used when installed.<sup>685</sup> It also claims that spare ribbons must be maintained for repair and maintenance purposes, and, therefore, a 100 percent fill factor is inappropriate.<sup>686</sup>

263. AT&T/WorldCom respond that the target fill factors are input into the MSM prior to considering the effect of breakage. After the fill factor is input, the MSM then calculates the effects of breakage.<sup>687</sup> Thus, the effective fill factor is less than 100 percent.

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<sup>679</sup> *Inputs Order*, 14 FCC Rcd at 20246-47, para. 207; AT&T Ex. 117P, at E1-E3 (confidential version).

<sup>680</sup> *Inputs Order*, 14 FCC Rcd at 20240, 20243-44, 20246-47, paras. 190-91, 199-201, 207.

<sup>681</sup> *See id.* at 20237-38, 20243-44, paras. 186, 200-01.

<sup>682</sup> AT&T/WorldCom Initial Cost Brief at 160; AT&T/WorldCom Reply Cost Brief at 70.

<sup>683</sup> *Inputs Order*, 14 FCC Rcd at 20247, para. 208; AT&T/WorldCom Initial Cost Brief at 160.

<sup>684</sup> AT&T/WorldCom Initial Cost Brief at 160; AT&T/WorldCom Reply Cost Brief at 70.

<sup>685</sup> Verizon Ex. 109, at 86-87; Verizon Reply Cost Brief at 153.

<sup>686</sup> Tr. at 5606; Verizon Reply Cost Brief at 153.

<sup>687</sup> AT&T/WorldCom Initial Cost Brief at 160.

**(b) Discussion**

264. We agree with AT&T/WorldCom and will use their proposed fiber feeder fill factor. Consistent with AT&T/WorldCom's position, in the *Inputs Order* the Commission determined that the ability to upgrade the electronics on the ends of the fiber sufficiently accounts for growth, churn and administrative functions.<sup>688</sup> The Commission thus adopted a 100 percent fiber feeder fill factor.<sup>689</sup> Further, fiber feeder cable is normally installed with 100 percent redundancy. That is, for every fiber strand installed, a separate strand is installed to account for any breakage that occurs. Thus, breakage is accounted for in a 100 percent fill factor.<sup>690</sup> Verizon's criticism that the MSM fails to account for the fact that fiber feeder is installed in 12-ribbon strands is misplaced. Our review of the MSM confirms that the values it uses assume that the installation of fiber cable occurs in groups of twelve or more fiber strands.

**(v) RT Plug-In and RT Common Electronics Fill Factors**

**(a) Positions of the Parties**

265. For RT plug-in cards and RT common electronics, AT&T/WorldCom propose using the same 70 percent to 82.5 percent fill factors that they use for copper feeder plant.<sup>691</sup>

266. Verizon argues that these fill factors are inappropriately high because they fail to account properly for growth and administrative services.<sup>692</sup>

**(b) Discussion**

267. We will use the fill factors for RT plug-in cards and RT common electronics that AT&T/WorldCom include in the MSM. As stated previously, Verizon's argument that AT&T/WorldCom fail to account for growth is incorrect.<sup>693</sup> Further, these fill factors are lower than the analogous switch port fill factors that we adopt herein,<sup>694</sup> suggesting that factors even higher than those proposed by AT&T/WorldCom may be appropriate. Finally, we note that, in its cost study, Verizon proposes the same fill factor for copper feeder and for RT common electronics, and it

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<sup>688</sup> *Inputs Order*, 14 FCC Rcd at 20247, para. 208.

<sup>689</sup> *Id.*

<sup>690</sup> *Id.* at 20240-41, 20247, paras. 192, 208.

<sup>691</sup> AT&T/WorldCom Ex. 14, at 54; AT&T/WorldCom Initial Cost Brief at 162-63; AT&T/WorldCom Reply Cost Brief at 70-71.

<sup>692</sup> See Verizon Initial Cost Brief at 161; Verizon Reply Cost Brief at 152-54; see also Verizon Ex. 109, at 87-90.

<sup>693</sup> See *supra* sections IV(C)(2)(g)(i)(b), IV(C)(2)(g)(ii)(b).

<sup>694</sup> See *infra* section V(C)(4)(b).

proposes a higher factor for RT plug-in cards than it proposes for copper feeder.<sup>695</sup>

**h. Plant Mix**

**(i) Introduction**

268. Plant mix refers to the relative proportion of different types of plant – aerial, buried, and underground – in a given area.<sup>696</sup> Aerial plant refers to telephone poles and their associated hardware, including anchors and guy wires.<sup>697</sup> Buried plant refers to plant placed underground in trenches without the use of conduits.<sup>698</sup> Underground plant refers to plant trenched underground and placed inside supporting and protective conduits.<sup>699</sup> For feeder plant, underground plant includes manholes and pullboxes.<sup>700</sup> Determining the appropriate forward-looking plant mix for different areas with different terrains and climate conditions is important because the structure, cable, installation, and maintenance costs vary based on the plant types modeled.<sup>701</sup>

**(ii) Positions of the Parties**

269. AT&T/WorldCom propose using plant mix inputs in the MSM that differ from those that the Commission used in the SM.<sup>702</sup> Specifically, they propose relying on Verizon's ARMIS data for Virginia from 1991 through 2000 to determine the ratio between aerial and buried cable.<sup>703</sup> Because the ARMIS data are not divided into density zones, AT&T/WorldCom manipulate the data to determine the appropriate mix of aerial to buried plant for each of the MSM's nine density zones. In the two densest zones (*i.e.*, zones eight and nine), AT&T/WorldCom determine that most plant would be aerial plant, with a considerable percentage consisting of intra-building cable.<sup>704</sup>

<sup>695</sup> See Verizon Ex. 107P, at 100 (confidential version).

<sup>696</sup> *Federal-State Joint Board on Universal Service*, CC Docket Nos. 96-45, 97-160, Further Notice of Proposed Rulemaking, 12 FCC Rcd 12514, 18540, para. 56 (1997) (*USF 1997 Further Notice*); *Federal-State Joint Board on Universal Service*, 1999 WL 343066, CC Docket Nos. 96-45, 97-160, FCC 99-304, paras. 103-04 (rel. May 28, 1999) (*Inputs Further Notice*).

<sup>697</sup> See, *e.g.*, *Inputs Further Notice*, para. 104.

<sup>698</sup> See, *e.g.*, *id.*

<sup>699</sup> See, *e.g.*, *id.*

<sup>700</sup> See, *e.g.*, *id.*

<sup>701</sup> *USF 1997 Further Notice*, 12 FCC Rcd at 18540, para. 56.

<sup>702</sup> AT&T/WorldCom Ex. 1, at 19; AT&T/WorldCom Ex. 6 (Riolo Direct), at 39-43; AT&T/WorldCom Ex. 23, Vol. 1 at 8; AT&T/WorldCom Initial Cost Brief at 171-72.

<sup>703</sup> AT&T/WorldCom Ex. 6, at 39-43; Tr. at 4563-65; AT&T/WorldCom Initial Cost Brief at 171-72.

<sup>704</sup> AT&T/WorldCom Ex. 6, at 39-42; Tr. at 4563-65.

AT&T/WorldCom then rely on one of their witnesses' experiences to determine the percentage of underground plant: they assume the use of almost no underground cable (one percent) in the six least dense zones (*i.e.*, zones one through six), and minimal underground cable in the three highest density zones (ten percent for the densest zone, *i.e.*, zone nine, and five percent for the zones seven and eight).<sup>705</sup>

270. Verizon criticizes the plant mix assumptions that AT&T/WorldCom propose as inappropriately speculative, unsupported, and inconsistent with real-world building constraints, such as municipal and zoning laws (including rights-of-way requirements), and weather and geography concerns specific to localities within Virginia.<sup>706</sup> Although a forward-looking cost model will reflect cost minimization strategies, Verizon contends that these existing, real-world considerations would constrain even the most efficient competitor, and therefore may not be ignored.<sup>707</sup> Verizon claims that its proposal takes all of these, and other, local specific factors into account in determining whether to build aerial, buried, or underground plant, but that the AT&T/WorldCom proposal does not.<sup>708</sup> Verizon also alleges that AT&T/WorldCom fail to explain how they use the ARMIS data to generate different inputs for different density zones.<sup>709</sup> Finally, Verizon claims that AT&T/WorldCom improperly assume a high amount of intra-building riser cable even though the Commission previously rejected such an assumption.<sup>710</sup> Accordingly, Verizon proposes that the Commission defer to Verizon's actual experiences.

271. Verizon proposes using data from engineering surveys of its employees, conducted between 1993 and 1995, to generate the plant mix for distribution and feeder plant.<sup>711</sup> Verizon claims that these data are based on the plant mix that Verizon, as an efficient company, actually experienced. Specifically, Verizon asserts that its plant mix is efficient and provides the best estimate of the mix that any current or future carrier would deploy to service demand in Virginia, given Verizon's existing wire center locations, state geography, and municipal and zoning laws (including rights of way requirements).<sup>712</sup>

272. AT&T/WorldCom criticize Verizon's plant mix proposal as inappropriately based on

<sup>705</sup> AT&T/WorldCom Ex. 6, at 39-42; AT&T/WorldCom Initial Cost Brief at 171; AT&T/WorldCom Reply Cost Brief at 73.

<sup>706</sup> Verizon Ex. 109, at 107-10; Verizon Initial Cost Brief at 158-60; Verizon Reply Cost Brief at 151.

<sup>707</sup> Verizon Ex. 109, at 109-10; Verizon Initial Cost Brief at 158-59.

<sup>708</sup> Verizon Initial Cost Brief at 158-60.

<sup>709</sup> Verizon Reply Cost Brief at 151 n.147.

<sup>710</sup> Verizon Ex. 109, at 108-09.

<sup>711</sup> Verizon Ex. 122, at 60-71; Verizon Reply Cost Brief at 68-71; *see* Verizon Ex. 100P, Vol. 1, Part B-1, section 4.8 (confidential version); *see also* Verizon Initial Cost Brief at 82-86.

<sup>712</sup> Verizon Initial Cost Brief at 83.



embedded (and unadjusted) data from the 1993-1995 time period.<sup>713</sup> They state that Verizon makes no attempt to update its survey results or independently validate them against more recent data or against Verizon's projections for new projects.<sup>714</sup> AT&T/WorldCom also contend that the surveys themselves are so fundamentally flawed as to be useless, even assuming *arguendo* that they otherwise could serve as an appropriate basis for forward-looking inputs.<sup>715</sup> Notably, Verizon submits only the survey results, but not the underlying survey data.<sup>716</sup> AT&T/WorldCom further criticize the Verizon plant mix inputs because, they claim, these inputs are the same across all density zones.<sup>717</sup>

### (iii) Discussion

273. We adopt, pursuant to the baseball arbitration rules,<sup>718</sup> Verizon's proposed percentages of underground distribution and feeder plant and AT&T/WorldCom's proposed relationship between aerial and buried plant for the remaining outside plant.<sup>719</sup> The AT&T/WorldCom proposal for underground plant lacks support, whereas the Verizon proposal relies on empirical data that appear to take into account Virginia specific conditions. For aerial and buried plant, however, we find AT&T/WorldCom's proposal is better substantiated and more consistent with forward-looking costing principles than Verizon's proposal. Specifically, AT&T/WorldCom rely on data through the year 2000, rather than only on 1993-1995 data. These data, moreover, implicitly account for Virginia specific conditions, are more transparent and verifiable than the Verizon survey data summaries, and result in varied plant mixes across density zones.

274. *Underground Plant.*<sup>720</sup> We adopt Verizon's proposals for the percentage of underground distribution and feeder plant. We agree with Verizon that AT&T/WorldCom's proposal is too speculative and unsupported. In particular, the AT&T/WorldCom proposal for the percentage of underground plant is based solely on the undocumented experiences of one of

<sup>713</sup> AT&T/WorldCom Initial Cost Brief at 168-73; AT&T/WorldCom Reply Cost Brief at 72-76.

<sup>714</sup> AT&T/WorldCom Reply Cost Brief at 73-76.

<sup>715</sup> AT&T/WorldCom Ex. 12, at 12-15; AT&T/WorldCom Initial Cost Brief at 49-51.

<sup>716</sup> See *supra* section IV(B)(2).

<sup>717</sup> See Tr. at 4418-19; AT&T/WorldCom Initial Cost Brief at 171.

<sup>718</sup> See *supra* section II(C).

<sup>719</sup> Although most of the testimony and briefing on this issue addresses the plant mix for distribution plant, we apply the same analysis for both distribution and feeder plant. That is, where we adopt Verizon's proposal for underground plant, we also adopt both its proposed distribution and feeder underground plant mix inputs. Similarly, we adopt the aerial and buried ratios that AT&T/WorldCom propose for both distribution and feeder plant.

<sup>720</sup> See *supra* para. 268 (describing underground plant).

AT&T/WorldCom's witnesses.<sup>721</sup> In the *Inputs Order*, the Commission generally declined to rely on unsubstantiated witness opinion to support a party's cost proposal,<sup>722</sup> and we similarly decline to do so here. AT&T/WorldCom, moreover, fail to provide any specific showing that their general underground plant mix estimates account for specific local Virginia conditions.<sup>723</sup>

275. Verizon's proposals for the percentages of underground plant, in contrast, rely on empirical, Virginia-specific data.<sup>724</sup> This is particularly important because, as the Commission noted in the *Inputs Order*, plant mix is more heavily influenced by state and local considerations than are most other inputs.<sup>725</sup> Although we have concerns about relying on stale data, we find that the Verizon data, compiled from actual worker responses, probably reflect deployment decisions responsive to local Virginia concerns, and, in any event, are more substantiated than the AT&T/WorldCom underground proposal, which relies on the unsupported opinion of an individual witness.<sup>726</sup>

276. *Aerial and Buried Plant.*<sup>727</sup> For the remaining (*i.e.*, non-underground) outside plant, we establish plant mix percentages by relying on the ratio of aerial to buried plant proposed by AT&T/WorldCom. AT&T/WorldCom base their ratio of aerial to buried plant on Verizon ARMIS data through the year 2000,<sup>728</sup> considerably more recent data than 1993-1995 vintage data that Verizon proposes to use.<sup>729</sup> The use of ten years of ARMIS data also demonstrates that the relative proportions of aerial and buried outside plant are consistent over time.<sup>730</sup> Further, in contrast to their

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<sup>721</sup> See AT&T/WorldCom Ex. 6, at 39.

<sup>722</sup> See *Inputs Order*, 14 FCC Rcd at 20229-30, paras. 165 (declining to adopt unsupported expert opinion for LEC engineering adjustment), 223 (declining to adopt unsupported expert opinion for structure costs buying power adjustment).

<sup>723</sup> See *Inputs Order*, 14 FCC Rcd at 20199, para. 93.

<sup>724</sup> See Verizon Ex. 122, at 60-71; Verizon Reply Cost Brief at 68-71.

<sup>725</sup> *Inputs Order*, 14 FCC Rcd at 20199, para. 93 ("varying plant mix by state, study area, or region of the country may more accurately reflect variations in forward-looking costs").

<sup>726</sup> We note that, although (as we discuss below) we are concerned about the Verizon survey's lack of transparency or verifiability, these concerns apply at least as much to unsupported AT&T/WorldCom witness statements.

<sup>727</sup> See *supra* para. 268 (describing aerial and buried plant types).

<sup>728</sup> AT&T/WorldCom Ex. 6, at 39-42.

<sup>729</sup> We note, moreover, that, although Verizon claims its experiences reflect those of an efficient carrier, Verizon was not subject to local price cap regulation until 1994, the middle of its survey period. See Verizon Initial Cost Brief at 14.

<sup>730</sup> For example, the relationship between aerial and buried distribution plant ranged from 38.6 percent to 61.4 percent, aerial to buried in 1991, to 34.9 percent to 65.1 percent in 2000. Similarly, the relationship between aerial and buried fiber feeder plant ranged from 31.1 percent to 23.6 percent, aerial to buried in 1991, to 36.3 percent to (continued....)

underground plant proposal, AT&T/WorldCom use Virginia ARMIS data, thus accounting for many Virginia specific local conditions.<sup>731</sup> The ARMIS data used by AT&T/WorldCom are also more transparent and verifiable than the Verizon data because the ARMIS data are publicly available, whereas the data underlying the 1993-1995 Verizon survey results were not introduced into the record. Thus, although Verizon's survey respondents may have accounted for then existing local conditions, we are unable to verify precisely how they did so or whether such conditions might have changed in recent years. For instance, municipal ordinances may have changed in the intervening decade since the surveys were first conducted.<sup>732</sup> Finally, we find that Verizon is mistaken in its assertion that the MSM should not include riser cable.<sup>733</sup> The MSM treats each location in a high-rise building as a separate customer location, thereby accounting for plant to each customer location.

**i. Structure Sharing**

**(i) Sharing Between Verizon and Other Companies**

**(a) Positions of the Parties**

277. AT&T/WorldCom propose changing the SM default values for structure sharing between Verizon and other companies to account for additional amounts of sharing that, they contend, an efficient competitor would experience compared to the sharing that Verizon actually achieved in deploying its embedded network.<sup>734</sup> By proposing higher levels of intercompany structure sharing, AT&T/WorldCom lower the costs attributable to Verizon, thereby decreasing loop costs. AT&T/WorldCom base their structure sharing proposal primarily on the experiences of one of their witnesses.<sup>735</sup>

278. Verizon challenges the intercompany structure sharing inputs that AT&T/WorldCom propose as overly speculative, unsupported, and based on arguments previously rejected by the Commission in the universal service proceedings.<sup>736</sup> Specifically, Verizon claims that AT&T/WorldCom present essentially the same arguments that the Commission previously rejected

(Continued from previous page) \_\_\_\_\_

24.1 percent in 2000. (The feeder plant percentages do not add up to 100 percent because data were included for underground feeder plant.) AT&T/WorldCom Ex. 6, at 39-42.

<sup>731</sup> See *Inputs Order*, 14 FCC Rcd at 20199, para. 93.

<sup>732</sup> We note, however, that the data are likely to have taken into account at least some local conditions that existed in the mid-1990s or earlier.

<sup>733</sup> See Verizon Ex. 109, at 108-09.

<sup>734</sup> AT&T/WorldCom Ex. 1, at 22; AT&T/WorldCom Ex. 23, Vol. 1 at 9; AT&T/WorldCom Ex. 18, at 15-18; Tr. at 4384-86; AT&T/WorldCom Initial Cost Brief at 174-78; AT&T/WorldCom Reply Cost Brief at 76-80.

<sup>735</sup> See AT&T/WorldCom Ex. 18, at 15-18.

<sup>736</sup> Verizon Ex. 109, at 94-101; Verizon Initial Cost Brief at 155-58; Verizon Reply Cost Brief at 148-50.

in the *Inputs Order*.<sup>737</sup> Verizon also contends that AT&T/WorldCom's proposal ignores the fact that other companies have no incentive to share Verizon's structure costs because they can simply come in later and lease capacity in the right-of-way (e.g., conduit) at cheaper rates.<sup>738</sup> Finally, Verizon opposes reverting to the inputs used in the SM because they do not reflect state-specific data.<sup>739</sup>

279. Verizon proposes using its existing structure sharing values, developed from actual plant deployment data between 1997 and 1999.<sup>740</sup> Verizon claims that it already takes advantage of any structure sharing opportunities that present themselves, but that these have been very few. Verizon further argues that there is no reason to believe that structure sharing opportunities will improve in the future.<sup>741</sup>

280. AT&T/WorldCom argue that Verizon's structure sharing proposal is improperly based on its embedded network and fails to account for any sharing of trenches in either buried or underground plant. They further claim that, if Verizon's network is to be used at all, Verizon's actual experiences in new developments could serve as a starting point.<sup>742</sup>

281. Verizon responds that the structure sharing opportunities it has experienced are more probative than the structure sharing opportunities that exist in new developments. Verizon's experiences in new developments overstate the sharing opportunities that would exist if Verizon were reconstructing its entire network, which would include both existing developments and new developments.<sup>743</sup>

#### (b) Discussion

282. During the hearing, a Verizon witness conceded the reasonableness of AT&T/WorldCom's buried structure sharing proposal, and an AT&T/WorldCom witness conceded the reasonableness of Verizon's aerial structure sharing proposal.<sup>744</sup> We agree with the parties that

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<sup>737</sup> Verizon Initial Cost Brief at 157 (citing *Inputs Order*, 14 FCC Rcd at 20260, para. 241). We note that the paragraph of the *Inputs Order* cited by Verizon does not support Verizon's assertion in its brief.

<sup>738</sup> *Id.* at 101-02 (citing Tr. at 4387).

<sup>739</sup> Verizon Ex. 109, at 101.

<sup>740</sup> Verizon Ex. 107, at 117, 216-217; Verizon Ex. 122, at 146-47; Verizon Initial Cost Brief at 95-97, 100-03; Verizon Reply Cost Brief at 66-68.

<sup>741</sup> Verizon Ex. 122, at 145-47; Tr. at 4380-81; Verizon Reply Cost Brief at 66-67.

<sup>742</sup> Tr. at 3217-18.

<sup>743</sup> *Id.* at 3223-25; Verizon Initial Cost Brief at 102-103; Verizon Reply Cost Brief at 66-68.

<sup>744</sup> Tr. at 4386 (Gansert: "First of all, with respect to buried, I have no argument."); *Id.* at 4378 (Baranowski: "The Verizon cost study included sharing of poles which we do not modify in our restatement of Verizon's costs."); see also AT&T/WorldCom Ex. 12, at 76.

(continued....)

these proposals are reasonable. Thus, for buried plant, we use the intercompany structure sharing percentages that AT&T/WorldCom propose, and for aerial plant, we use the intercompany structure sharing percentages that Verizon proposes.

283. For underground plant, we adopt AT&T/WorldCom's structure sharing proposal for MSM density zones one and four through nine, and Verizon's structure sharing proposal for zones two and three. We reach this conclusion by comparing each side's proposals to the objective, reasonable structure sharing percentages that the Commission adopted on a nationwide basis in the *Inputs Order*.<sup>745</sup> We then apply the baseball arbitration rules<sup>746</sup> and choose the proposal that is closer to the Commission's national figure for the particular density zone. We do so because, as we explain in more detail below, neither side provided sufficient substantiation to justify their underground structure sharing proposals.

284. We find that neither side presents sufficient support for its underground structure sharing proposal to enable us to adopt it solely on its own merit. Rather, both of the proposals before us are the sort of unsupported opinion upon which the Commission refused to rely in the *Inputs Order*.<sup>747</sup> Specifically, AT&T/WorldCom's underground sharing inputs are based solely on the unsubstantiated opinions of their witnesses, and AT&T/WorldCom fail to provide documentation to support these opinions. Just as the Commission concluded that unsupported opinions were insufficient bases to support a Commission determination on structure sharing in the universal service proceedings,<sup>748</sup> so too we decline to rely solely on AT&T/WorldCom's unsubstantiated opinions here.

285. Verizon's proposal is similarly unsupported. Verizon claims that its underground sharing inputs are based on its actual and recent experiences. Actual recent experiences may be particularly probative for this input because Verizon, operating as a price cap carrier in Virginia during the years reflected in its sharing data (1997-1999), retained incentives to share structure costs with other entities. Further, in determining forward-looking structure sharing opportunities between companies, we agree with Verizon that our examination should not be restricted to new growth

(Continued from previous page) \_\_\_\_\_

To the extent that the Verizon aerial plant structure sharing proposal contained in its re-run of the MSM differs slightly from the aerial sharing inputs used in the Verizon LCAM, we use the proposal contained in the Verizon MSM re-run. Compare Verizon Ex. 204, with Verizon Ex. 100P, Vol. 1, Part B, sections 2.1 and 8.1 (confidential version). We find the Verizon proposal in its MSM re-run superior because it reflects higher levels of structure sharing in denser zones, whereas the Verizon inputs in the LCAM are the same across all density zones. Compare Verizon Ex. 204, with Verizon Ex. 100P, Vol. 1, Part B, sections 2.1 and 8.1 (confidential version). Indeed, both the Commission and Verizon have recognized that there are fewer sharing opportunities in less dense areas than in denser areas. *Inputs Order*, 14 FCC Rcd at 20260-63, paras. 243, 248; Verizon Ex. 109, at 97.

<sup>745</sup> See *Inputs Order*, 14 FCC Rcd 20260-61, para. 243.

<sup>746</sup> See *supra* section II(C).

<sup>747</sup> See *Inputs Order*, 14 FCC Rcd at 20261, para. 244.

<sup>748</sup> See *id.*

areas. New growth developments, by definition, would have significantly higher sharing opportunities than would exist in reconstructing the entire network.

286. Verizon's restatement of the underground sharing percentages in the MSM, however, does not appear to incorporate sharing percentages taken from its recent data. Instead, Verizon uses the input of 97 percent sharing (*i.e.*, only three percent of underground costs are shared with other entities, with Verizon solely responsible for 97 percent of underground structure costs) in its re-run of the MSM. This figure is every bit as undocumented as the AT&T/WorldCom proposal. The only support for this figure is a Verizon witness statement, during the hearing, that the appropriate underground sharing percentage is 97 percent.<sup>749</sup> This witness then defers to a different Verizon witness to explain the source of this figure,<sup>750</sup> an explanation that never came. This figure, moreover, is inconsistent with the treatment of underground sharing in the LCAM, which appears to assume no sharing. Finally, despite the Commission's prior finding, and Verizon's recognition, that sharing varies by density zone,<sup>751</sup> Verizon proposes 97 percent sharing in all density zones.<sup>752</sup>

287. We therefore are left to choose between opposing positions – AT&T/WorldCom's claim that an efficient carrier will always share underground costs and Verizon's claim that, in actuality, it is almost never able to find companies willing to share its costs of deploying underground plant – either of which may be reasonable and both of which are unsupported by actual documentation. The Commission adopted forward-looking sharing percentages in the *Inputs Order*. Those values are the only independent evidence of forward-looking structure sharing values available to us to evaluate the parties' underground structure sharing proposals.<sup>753</sup> Accordingly, consistent with the baseball arbitration rules,<sup>754</sup> we use the SM default values as an independent basis to choose between the parties' proposals. Specifically, for each of the MSM's nine density zones, we adopt the proposed underground plant structure sharing percentage that is closer to the default percentage.

288. The following table summarizes the proposals before us and identifies the inputs we adopt:

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<sup>749</sup> Tr. at 4382.

<sup>750</sup> *Id.* at 4383.

<sup>751</sup> *Inputs Order*, 14 FCC Rcd at 20260-63, paras. 243, 248; *see also* Verizon Ex. 109, at 97; Verizon Ex. 204 (Verizon aerial plant sharing proposal for the MSM varies by density zone).

<sup>752</sup> Verizon Ex. 204.

<sup>753</sup> We note that in the *Inputs Order* the Commission used its predictive judgment to adopt structure sharing percentages. *Inputs Order*, 14 FCC Rcd at 20262, paras. 245, 247.

<sup>754</sup> *See supra* section II(C).

SM/MSM density zone	Underground Structure Sharing Percentage			
	SM	MSM	Verizon MSM re-run	Decision
1	100	100	97	100
2	100	50	97	97
3	85	50	97	97
4-6	65	50	97	50
7-9	55	50	97	50

**(ii) Structure Sharing Between Feeder and Distribution Plant**

**(a) Positions of the Parties**

289. AT&T/WorldCom propose reducing the SM default inputs for structure costs for feeder plant by 40 percent to reflect 40 percent structure sharing between feeder plant and distribution plant.<sup>755</sup> This proposal is based on an order of the Kansas Corporation Commission, the cost model filed by BellSouth in state cost proceedings in Florida and Louisiana, and on the experiences of AT&T/WorldCom witnesses.<sup>756</sup> The Kansas order and the new BellSouth model support sharing between feeder and distribution plant at levels substantially in excess of those in the SM. In particular, AT&T/WorldCom claim that the Kansas Commission, in determining outside plant costs in a state universal service proceeding, found that over 40 percent of feeder routes share structure with distribution cable.<sup>757</sup> AT&T/WorldCom also claim that the BellSouth cost studies show considerable structure sharing between feeder and distribution, with 74 percent of feeder routes being shared with distribution facilities.<sup>758</sup> Finally, AT&T/WorldCom's witnesses explain that considerable sharing between feeder and distribution structure would occur in efficient outside plant design.<sup>759</sup>

290. Verizon challenges AT&T/WorldCom's proposed reduction in feeder structure costs. Verizon claims the AT&T/WorldCom proposal is unsupported by any Virginia specific data and is inconsistent with the MSM's own plant mix assumption in high density areas of 70 percent

<sup>755</sup> AT&T/WorldCom Ex. 1, at 22; AT&T/WorldCom Ex. 6, at 10-12; Tr. at 4538-4539; AT&T/WorldCom Initial Cost Brief at 180-81.

<sup>756</sup> AT&T/WorldCom Ex. 1, at 22; AT&T/WorldCom Ex. 6, at 10-12; *see also supra* section IV(C)(2)(c)(ii).

<sup>757</sup> AT&T/WorldCom Ex. 6, at 10-12; AT&T/WorldCom Initial Cost Brief at 179 (citing *Kansas Commission USF Order*, paras. 52, 54).

<sup>758</sup> AT&T/WorldCom Ex. 6, at 11-12; AT&T/WorldCom Initial Cost Brief at 179.

<sup>759</sup> AT&T/WorldCom Ex. 6, at 11-12; AT&T/WorldCom Ex. 18, at 17-18; AT&T/WorldCom Initial Cost Brief at 179; *see also* AT&T/WorldCom Ex. 1, at 22.

underground cable for feeder plant and only ten percent for distribution plant.<sup>760</sup>

**(b) Discussion**

291. We find that AT&T/WorldCom's proposal to reduce feeder plant structure costs by 40 percent to account for structure sharing between feeder and distribution plant is appropriate in an efficient, forward-looking cost model and supported by the record. Verizon's affirmative cost study, the LCAM, undermines its challenge to AT&T/WorldCom's feeder/distribution structure sharing proposal. Specifically, Verizon admits that the LCAM applies an approximately 20 percent reduction to both distribution and feeder structure costs to account for structure sharing between feeder and distribution.<sup>761</sup> Because distribution plant costs significantly exceed feeder plant costs, Verizon's application of sharing cost savings equally to distribution and feeder plant would lead to lower costs than does AT&T/WorldCom's application of the entire sharing factor to feeder plant.<sup>762</sup> The AT&T/WorldCom sharing inputs, moreover, are supported by additional independent sources – the *Kansas USF Order* and BellSouth's cost models filed in Florida and Louisiana. Notably, the *Kansas USF Order* found that, for each of the fourteen wire centers examined, "at least 40 percent of the feeder routes also included distribution cable [and, in] some wire centers, the percentage was much higher."<sup>763</sup> Further, Verizon does not challenge the feeder/distribution figures that AT&T/WorldCom contend are contained in the *Kansas USF Order* and in the BellSouth cost models. Although we do not find the *Kansas USF Order* or the BellSouth cost studies dispositive of the appropriate feeder/distribution structure sharing for Verizon, they support the reasonableness of the AT&T/WorldCom proposal.

**j. Pole / Aerial Plant Investment**

**(i) Positions of the Parties**

292. AT&T/WorldCom propose using in the MSM the aerial structure (*e.g.*, poles, anchors, guy wires) investment costs adopted by the Commission in the *Inputs Order*.<sup>764</sup> The

<sup>760</sup> Verizon Ex. 109, at 98-100; Verizon Reply Cost Brief at 150.

<sup>761</sup> Tr. at 4536-38.

<sup>762</sup> See *id.* at 4538-40. Verizon's argument that AT&T/WorldCom's proposed 40 percent reduction in feeder structure is inconsistent with the MSM's plant mix assumptions for all plant types in all density zones proves too much, particularly in light of Verizon's concession that considerable structure sharing between feeder and distribution plant will occur. Just as the 20 percent reduction in feeder and distribution structure in the LCAM is an aggregate figure, so too is the 40 percent feeder reduction proposed by AT&T/WorldCom. As such, it represents an average amount of savings across all plant types in all density zones. Although a more nuanced approach analyzing the amount of sharing in each density zone for each plant type might be superior to AT&T/WorldCom's proposal, neither side presented such a proposal. That the perfect approach is not before us does not compel us to reject AT&T/WorldCom's reasonable proposal.

<sup>763</sup> *Kansas Commission USF Order*, para. 52.

<sup>764</sup> AT&T/WorldCom Ex. 12, at 42; AT&T/WorldCom Initial Cost Brief at 183.



Commission based those costs on an independent study conducted by David Gabel and Scott Kennedy for the National Regulatory Research Institute (NRRI).<sup>765</sup> This study analyzed publicly available contract data obtained from the Rural Utilities Service (RUS) of the United States Department of Agriculture. The study then applied regression analyses to these contract data to determine average pole investment values, adjusted to 1997 dollars.<sup>766</sup>

293. In the *Inputs Order*, the Commission used the pole investment values from the Gabel Study as the starting point for determining aerial structure costs. The Commission then added to this amount the costs of anchors and guy wires (broken down by density zone) from the Gabel Study, which were not included in the RUS contracts, but rather were based on the comments of experts. The Commission applied a ten percent engineering loading factor to account for the fact that the RUS contracts did not include LEC engineering, and applied a thirty percent water factor where the water table was less than three feet. These costs were then applied to the pole spacing assumptions used by the model, which vary by density zone.<sup>767</sup>

294. The following chart identifies the 27 different aerial structure investment inputs (per pole) that the Commission used in the SM and that AT&T/WorldCom propose using in the MSM:<sup>768</sup>

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<sup>765</sup> David Gabel and Scott Kennedy, *Estimating the Cost of Switching and Cables Based on Publicly Available Data* (The National Regulatory Research Institute 1998) (Gabel Study). NRRI functions as the research organization of the National Association of Regulatory Commissioners (NARUC). See <http://www.nrri.ohio-state.edu/about/> (visited Dec. 18, 2002).

<sup>766</sup> Gabel Study, at 1-3, 8, 33-34, 50-55.

<sup>767</sup> See *Inputs Order*, 14 FCC Rcd at 20204-37, 20250-53, paras. 104-85, 218-25.

<sup>768</sup> Although both AT&T/WorldCom and Verizon state in testimony that the average per pole investment in the SM and the MSM is \$417, we do not believe that this is correct in the context of loops. The \$417 figure is the average pole investment cost in the transport module. Neither the SM nor the MSM produces a weighted average of the 27 different pole investment figures used by the model.

Aerial Structure Costs (per pole) <sup>769</sup>						
	Water Table > 3 feet			Water Table < 3 feet		
Density	Normal	SoftRock	HardRock	Normal	SoftRock	HardRock
1	\$ 377.99	\$ 450.67	\$ 523.36	\$ 491.38	\$ 585.88	\$ 680.37
2	\$ 377.99	\$ 450.67	\$ 523.36	\$ 491.38	\$ 585.88	\$ 680.37
3	\$ 396.67	\$ 469.35	\$ 542.04	\$ 515.67	\$ 610.16	\$ 704.65
4	\$ 396.67	\$ 469.35	\$ 542.04	\$ 515.67	\$ 610.16	\$ 704.65
5	\$ 396.67	\$ 469.35	\$ 542.04	\$ 515.67	\$ 610.16	\$ 704.65
6	\$ 396.67	\$ 469.35	\$ 542.04	\$ 515.67	\$ 610.16	\$ 704.65
7	\$ 396.67	\$ 469.35	\$ 542.04	\$ 515.67	\$ 610.16	\$ 704.65
8	\$ 408.23	\$ 480.91	\$ 553.60	\$ 530.69	\$ 625.19	\$ 719.68
9	\$ 408.23	\$ 480.91	\$ 553.60	\$ 530.69	\$ 625.19	\$ 719.68

295. Verizon claims that the AT&T/WorldCom aerial structure investment inputs are unsupported. It also contends that the MSM understates aerial investment costs and attempts to demonstrate this by comparing pole costs used in the MSM to the pole costs that Verizon would incur to replace all of its existing poles. Specifically, Verizon proposes determining the per pole costs by starting with its book cost (total plant in service or TPIS) of poles in Virginia from its year 2000 ARMIS data and spreading this amount over the total number of poles in Verizon's network in Virginia, again based on ARMIS data.<sup>770</sup> This generates a book cost per pole of \$299. Verizon then multiplies this figure by the current-to-book ratio of 2.39 used in the *Inputs Order* to arrive at a cost per pole of \$713.<sup>771</sup> Verizon proposes applying this figure to the total number of poles in Verizon's actual network. This results in total pole investments of \$203 million, an amount that is 217 percent higher than the total pole investment amount used in the MSM.<sup>772</sup>

296. AT&T/WorldCom defend their proposal, claiming that, in a forward-looking environment, efficiencies from sequential installation and mobilization and demobilization would be captured in pole installation investments. AT&T/WorldCom also contend that the higher costs of replacing single poles at a time should not be included, as they are in Verizon's proposal, because

<sup>769</sup> The actual aerial structure investment inputs used by the models are per foot costs, not per pole costs. To facilitate understanding of aerial costs, however, we have derived per pole costs by applying the pole spacing assumption used by the model to the aerial investment data.

<sup>770</sup> Verizon Ex. 108, at 35-36, 41-42.

<sup>771</sup> *Id.* at 41-42.

<sup>772</sup> *Id.*; Verizon Initial Cost Brief at 162. We note that the \$713 cost per pole in Verizon's rebuttal testimony compares to a per pole cost of \$1007 that Verizon uses in the LCAM, which is based on data from 1996-2000. Compare Verizon Ex. 108, at 41-42, with Verizon Ex. 100, Vol. I, Part B, section 2.1.

these costs fail to account for economies of scale.<sup>773</sup>

(ii) Discussion

297. We will use the aerial structure investment inputs that AT&T/WorldCom propose and that the Commission developed in the *Inputs Order*.

298. Both proposals are reasonable.<sup>774</sup> AT&T/WorldCom's proposal relies on structure investments: (1) that the Commission expressly endorsed in the *Inputs Order*, and (2) that were based on an independent analysis of publicly available contract data.<sup>775</sup> Verizon's proposal is based on its ARMIS data,<sup>776</sup> which we rely on in other parts of this order,<sup>777</sup> and on a cost-to-book ratio used by the Commission in the *Inputs Order*.<sup>778</sup> Because Verizon's proposal is based on ARMIS data, it reflects Virginia-specific data, whereas the AT&T/WorldCom proposal uses nationwide data. Both proposals rely on data that is somewhat embedded in nature. AT&T/WorldCom rely on RUS contract data from the mid-1990s, adjusted to 1997 dollars.<sup>779</sup> Verizon relies on ARMIS data that include pole investments going back many years.

299. Although both approaches are reasonable, we find that the AT&T/WorldCom approach is the better of the two. Because the investment inputs adopted in the *Inputs Order* were based on publicly available RUS contract data, these data are verifiable and transparent. In addition, because the RUS contracts used in the Gabel Study were contracts for large jobs, they capture the economies of scale associated with the TELRIC reconstructed network. Further, inasmuch as the RUS contracts came from smaller LECs, they may overstate costs compared to Verizon because the RUS carriers probably lack the buying/bargaining power of Verizon.<sup>780</sup> Finally, we note that, in comments to the *Inputs Further Notice*, Sprint, SBC, and BellSouth indicated that the anchor and

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<sup>773</sup> AT&T/WorldCom Ex. 14, at 25-28; AT&T/WorldCom Initial Cost Brief at 183-84; AT&T/WorldCom Reply Cost Brief at 80-82.

<sup>774</sup> Even if we were to use Verizon's pole investment per pole figure, we would apply it to the aerial structure generated by the MSM model run, not to the total number of poles that actually exist in Verizon's network.

<sup>775</sup> *Inputs Order*, 14 FCC Rcd at 20247-53, paras. 209-226; Gabel Study, at 1-3, 8, 33-34, 50-56.

<sup>776</sup> Verizon Ex. 108, at 41-42.

<sup>777</sup> See, e.g., *supra* sections IV(C)(2)(b), IV(C)(2)(h).

<sup>778</sup> See *Inputs Order*, 14 FCC Rcd at 20349-50, paras. 436-39.

<sup>779</sup> See Gabel Study, at 50.

<sup>780</sup> We note that the Commission declined to apply a buying power adjustment as advocated by AT&T and MCI because these parties failed to supply any data to quantify the need for such an adjustment. *Inputs Order*, 14 FCC Rcd at 20257, para. 233. This decision contrasts with the Commission's decision to apply a downward 15.2 percent buying power adjustment for aerial cable costs, which was based on specific data that Verizon (then Bell Atlantic) had provided to the Maine Commission. *Id.* at 20223-29, paras. 148-63.

guy wire costs used by the Commission were reasonable.<sup>781</sup> The AT&T/WorldCom approach may understate costs, however, because it is based solely on the large jobs reflected in the RUS contracts and thereby fails to account for small or individual replacement jobs, which would be necessary to maintain the reconstructed network.

300. Verizon's approach, on the other hand, probably overstates costs because it includes all of Verizon's small/individual replacement jobs. Specifically, ARMIS data for poles include all investments for jobs as small as a single pole job. Most of Verizon's poles were deployed years ago, and much of the recent investment in poles is due to small/individual pole replacement jobs. Notably, in response to a hearing record request, Verizon stated that the average number of poles per job in 1999 and 2000 was less than 1.4.<sup>782</sup>

301. Verizon's approach also raises implementation problems. Specifically, Verizon offers no testimony to show how it would apply its single input figure into the MSM, which, as described above, calculates pole investments for two different water levels, nine different density zones, and three different rock conditions, and uses different inputs for anchor and guy wire investments for each of three density zones. In particular, regarding the water table, the MSM makes various corrections for water levels at different points in the model. We are unable to identify the effect that use of Verizon's single per pole investment figure would have on these internal model corrections. In addition, even if we were able to determine how to apply the single Verizon input figure, it does not lend itself to generating geographically deaveraged rates as well as the disaggregated MSM aerial plant investment inputs do.<sup>783</sup>

302. Accordingly, because the approach proposed by AT&T/WorldCom is reasonable, was previously endorsed by the Commission based on independently verifiable, publicly available data, and because we are unable to implement Verizon's counter-proposal, we will use the AT&T/WorldCom aerial structure investment input data.

#### **k. Digital Loop Carrier Type**

##### **(i) Introduction**

303. In addition to cable and structure investments, the other key loop investment component consists of electronics. In the loop plant, electronics are generally contained, and their costs accounted for, in DLC systems. Thus, one of our critical determinations is the type(s) of DLC system(s) to use in a TELRIC model.

304. AT&T/WorldCom and Verizon both assume that a certain (albeit different) percentage of loops use fiber feeder cable and a certain percentage of loops are all-copper

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<sup>781</sup> See *Inputs Order*, 14 FCC Rcd at 20252-53, para. 222.

<sup>782</sup> See Verizon Ex. 205 (Verizon response to record request no. 23 (requested Oct. 30, 2001)).

<sup>783</sup> See 47 C.F.R. § 51.507(f).

loops.<sup>784</sup> Because we are using the MSM to generate the basic 2-wire loop rates, the model (e.g., clustering algorithms, copper/fiber breakpoint) will determine the relative percentages of copper and fiber feeder plant. The key difference between the parties is whether, in a forward-looking network, to assume (1) that all fiber feeder would use next generation DLC (NGDLC) equipment that uses a GR-303 switch interface standard, or (2) that some fiber feeder would use integrated DLC (IDLC) equipment that uses a TR-008 switching interface standard and some would use universal DLC (UDLC) equipment.

305. Because the parties were often unclear or even inconsistent in their use of certain key DLC terms, we explain in detail the different types of fiber-based DLC systems relevant to this proceeding.<sup>785</sup> A DLC system consists of an RT in the outside plant, with a central office terminal (COT) in the central office (CO). The RT and the COT are typically connected by a fiber feeder facility. The RT terminates the metallic part of the loop coming from the end-user premises, converts the analog signal from the loop to digital format, and multiplexes the digital signals from a number of these lines onto fiber for carriage to the CO.<sup>786</sup> At the CO the fiber terminates on a fiber distribution frame (FDF). From the FDF, the signals may connect to a number of different kinds of COTs, depending on the type of DLC system used.

- *Universal Digital Loop Carrier (UDLC)* – With UDLC, the COT reverses the RT functions. That is, the COT de-multiplexes from multiplexed fiber formats to individual DS-0s, converts these DS-0s to analog format, and transmits the analog signals on copper pairs connecting to the switch via the Main Distribution Frame (MDF). The interface standard used in connecting the COT to the switch in an UDLC system is typically the TR-057 standard.<sup>787</sup> UDLC systems are the oldest type of fiber-based DLC system, dating to the 1970s.
- *Integrated Digital Loop Carrier (IDLC)* – With IDLC, all or part of the COT function is built, or integrated, into the switch, and there is no conversion from DS-0 to analog format (as occurs in an UDLC system). Other stages of multiplexing, between DS1 and higher speed formats, may either be built into the switch or provided in an external COT. IDLC systems were first developed in the 1980s.

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<sup>784</sup> Loops may be all-copper loops either because they use copper feeder cable or because the customer location is close enough to the central office for the loop to consist only of distribution plant.

<sup>785</sup> For additional information on the development of different types of DLC systems, see generally AT&T Ex. 122, §§ 12.6-12.7 at 12-22 – 12-30; see also *Integrated Digital Loop Carrier System Generic Requirements, Objectives, and Interface*, GR-303-CORE, Issue 4 (Telcordia Dec. 2000); *Digital Interface Between the SLC-96 Digital Loop Carrier System and a Local Digital Switch*, GR-8-Core, Issue 01 (Telcordia Oct. 2001); *Functional Criteria for Digital Loop Carrier Systems*, GR-57-CORE, Issue 1 (Telcordia Oct. 2001).

<sup>786</sup> Copper carrier is sometimes used with small RTs, but this is not relevant to the issue here.

<sup>787</sup> See *Functional Criteria for Digital Loop Carrier Systems*, GR-57-CORE, Issue 01 (Telcordia Oct. 2001).

There are two main IDLC switch interface standards: TR-008<sup>788</sup> and GR-303.<sup>789</sup> The TR-008 standard was developed first (in the 1980s), while the GR-303 was developed more recently (in the 1990s). The main difference between them is that TR-008 requires 1:1 or 2:1 distribution to feeder line concentration, whereas GR-303 supports these and higher (e.g., 3:1, 4:1) concentration ratios. (Concentration above the 1:1 level takes advantage of the fact that most people are not simultaneously using their lines by deploying less feeder plant than would be necessary to provide service to all lines at the same time.) Although DLC systems using a TR-008 interface can support a 2:1 concentration ratio, in this proceeding the parties discuss TR-008 only in terms of a 1:1 ratio. The GR-303 standard, unlike the TR-008 standard, was designed to enable DLC systems to support several interface groups of lines that connect to several different switches (i.e., within one DLC system, use more than one interface to connect separate groups of lines to separate switches).

- *Next Generation Digital Loop Carrier (NGDLC)* – There is no universally accepted definition of NGDLC. The reference to “next generation” in NGDLC means different things to different people. Some use the term “NGDLC” interchangeably with “GR-303.” Others use the term NGDLC to refer to DLC systems that include integration of digital subscriber line access multiplexer (DSLAM) functionality into the RT, along with the ability of the COT to split off the DSL signal and send it to an ATM switch in the CO. NGDLC systems may provide IDLC and/or UDLC functionalities. They may interface with the switch using the GR-303, TR-008, or TR-057 (universal) standard. Although there is no precise definition of what is meant by the “NG” in NGDLC, in this proceeding the parties most frequently use the term NGDLC to refer to the Alcatel Litespan<sup>®</sup>-2000 family of DLC systems (or equivalent systems) configured with the GR-303 switch interface standard.<sup>790</sup> Accordingly, we will use this definition of NGDLC systems for the limited purpose of this order.

## (ii) Positions of the Parties

306. Verizon proposes the following breakdown for feeder plant systems: 17.7 percent copper; 24.7 percent UDLC; 57.6 percent TR-008 IDLC,<sup>791</sup> which results in 70 percent of the

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<sup>788</sup> See *Digital Interface Between the SLC-96 Digital Loop Carrier System and a Local Digital Switch*, GR-8-CORE, Issue 01 (Telcordia Oct. 2001).

<sup>789</sup> See *Integrated Digital Loop Carrier System Generic Requirements, Objectives, and Interface*, GR-303-CORE, Issue 04 (Telcordia Dec. 2000).

<sup>790</sup> See, e.g., WorldCom Ex. 119P (Bell Atlantic Network Planning Guideline, NP-G-97-027, Issue No. 1 (April 1999)), at 1-21 (confidential version); WorldCom Ex. 120P (Verizon Network Planning guideline, NP-G-99-021, Issue 1.0, Litespan-2000 Application Guidelines (Nov. 2000)), at 1-28 (confidential version); Tr. at 4084, 4173-89.

<sup>791</sup> Verizon Ex. 107, at 97; see also Verizon Ex. 122, at 60-61.

fiber feeder using IDLC systems and 30 percent using UDLC systems.<sup>792</sup> Verizon claims that these percentages represent its actual deployment breakdown in new growth areas.<sup>793</sup> Verizon then proposes to adjust its percentages by applying the forward-looking assumption that 10 percent of the total network would consist of loops that traverse NGDLC systems.<sup>794</sup>

307. Verizon argues that its assumption of any NGDLC is generous because it has not deployed any NGDLC in Virginia and, in light of anticipated developments in packet technologies, has no plans to deploy any.<sup>795</sup> TR-008 IDLC equipment, on the other hand, was developed before NGDLC equipment and has been and is being extensively deployed by Verizon. Because of this investment, including the switching and switching interface investments already made by Verizon, it is not cost effective for Verizon to upgrade to NGDLC. Therefore, Verizon intends to continue deploying TR-008 IDLC equipment.<sup>796</sup>

308. Verizon further argues that UDLC systems are necessary for the provision of unbundled loops either because: (1) IDLC and NGDLC loops (regardless of which switch interface standard, TR-008 or GR-303, is used) are not capable of being unbundled,<sup>797</sup> or (2) if such loops can be unbundled, extensive manual tasks (which lead to considerable non-recurring costs) are required to perform the unbundling.<sup>798</sup> Verizon also argues that certain types of retail special access lines can be provided only over UDLC-based loops or all-copper loops.<sup>799</sup> In addition, Verizon claims that certain OSS and network security concerns would need to be resolved before NGDLC unbundling could occur.<sup>800</sup> Although Verizon West has deployed NGDLC systems, it has yet to develop OSS that supports the unbundling of loops traversing such systems.<sup>801</sup> Finally, Verizon claims that it never undertook the deployment of NGDLC discussed in its guidelines from the late 1990s, and that Verizon's current plans do not include

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<sup>792</sup> Verizon Ex. 107, at 97; Verizon Ex. 122, at 76; Verizon Initial Cost Brief at 88.

<sup>793</sup> Verizon Ex. 107, at 97-98; Verizon Ex. 122, at 85; *see also* Verizon Initial Cost Brief at 88.

<sup>794</sup> Verizon Ex. 107, at 97, 99; Tr. at 4154-57; Verizon Initial Cost Brief at 93-94; Verizon Reply Cost Brief at 65.

<sup>795</sup> Verizon Ex. 107, at 97, 99; Tr. at 4087; Verizon Initial Cost Brief at 93-94.

<sup>796</sup> Verizon Ex. 107, at 99; Verizon Ex. 122, at 83, 85; Tr. at 4076-78, 4150-59, 4169-76.

<sup>797</sup> Verizon Ex. 107, at 25-26, 97-99; Verizon Ex. 122, at 77-82; Tr. at 4070, 4151-53, 4179-86, 4577-87; Verizon Initial Cost Brief at 89-90; Verizon Reply Cost Brief at 61-64.

<sup>798</sup> Verizon Ex. 116 (NRC Panel Rebuttal), at 46-49; *see also* Verizon Ex. 100, Vol. 11, Non-Recurring Costs Summary; *see infra* section X.

<sup>799</sup> Verizon Ex. 122, at 77; Tr. 4074, 4078-85.

<sup>800</sup> Verizon Ex. 122, at 80-82; Tr. 4165-67, 4188-89, 4587; Verizon Initial Cost Brief at 90-93; *see also* Verizon Reply Cost Brief at 63.

<sup>801</sup> Tr. 4587-90; Verizon Initial Cost Brief at 90-92.

deployment of NGDLC systems in Virginia.<sup>802</sup>

309. AT&T/WorldCom claim that all fiber feeder plant should consist of GR-303 NGDLC systems.<sup>803</sup> They contend that NGDLC is the most advanced form of DLC currently available. Older forms of DLC, such as UDLC systems and IDLC systems that use a TR-008 switch interface, are less advanced and more costly systems, and, therefore, they should not be used in a TELRIC model.<sup>804</sup> AT&T/WorldCom claim that internal Verizon documents and other documents introduced into evidence show that Verizon is capable of unbundling NGDLC based loops today.<sup>805</sup> AT&T/WorldCom also claim that Telcordia<sup>TM</sup> Technologies, Inc.'s Notes on the Network demonstrates how to unbundle NGDLC loops.<sup>806</sup> Further, the Commission assumed 100 percent NGDLC in determining the DLC investment inputs to use in the *Inputs Order*.<sup>807</sup> AT&T/WorldCom contend that the unbundling of loops that traverse NGDLC systems would occur at the DS-1 level.<sup>808</sup>

### (iii) Discussion

310. We agree with AT&T/WorldCom and will assume that all fiber feeder plant uses NGDLC systems. As we explain in the following subsections: (1) GR-303 NGDLC systems are more advanced and efficient systems than are TR-008 IDLC systems; (2) Verizon fails to meet its burden of proof of showing that the unbundling of NGDLC loops is not technically feasible; (3) Verizon non-cost testimony shows that NGDLC loops are capable of being unbundled today; (4) UDLC loops are not needed to provide non-switched special services; and (5) neither

<sup>802</sup> Tr. 4156-59; *see also* Verizon Ex. 122, at 83; Verizon Initial Cost Brief at 93-94.

<sup>803</sup> AT&T/WorldCom Ex. 12, at 20-21; AT&T/WorldCom Initial Cost Brief at 133-143; AT&T/WorldCom Reply Cost Brief at 54.

<sup>804</sup> AT&T/WorldCom Ex. 12, at 20-30; *see also* AT&T/WorldCom Initial Cost Brief at 133-143; AT&T/WorldCom Reply Cost Brief at 54-57.

<sup>805</sup> AT&T/WorldCom Ex. 12P (Recurring Cost Panel Rebuttal), at 27 (confidential version) (citing WorldCom Ex. 119P (confidential version)); WorldCom Ex. 119P, at 1-4, 12 (confidential version); WorldCom Ex. 120P, at 3-13 (confidential version); Tr. at 4167; AT&T/WorldCom Initial Cost Brief Proprietary at 133-43 (confidential version); AT&T/WorldCom Reply Cost Brief at 55-56; *see also* Tr. at 4611-18.

<sup>806</sup> AT&T/WorldCom Initial Cost Brief at 135-36 (citing AT&T Ex. 122). Telcordia Technologies, Inc. (formerly known as Bellcore) is a telecommunications systems, software, and research company, which "was created as a center for technical expertise and innovation serving the U.S. regional Bell operating companies (RBOCs)." URL: <http://www.telcordia.com/aboutus/background.html> (visited June 18, 2003).

<sup>807</sup> *See Inputs Order*, 14 FCC Rcd at 20276-77, para. 280 n.593 ("AT&T and MCI also claim that Sprint fails to make use of forward-looking technology such as GR303-capable hardware. . . . Contrary to AT&T and MCI's assertion, the data supplied by Sprint and reflected in the contract data adopted herein reflects the cost of GR303-capable hardware." (internal citations omitted)).

<sup>808</sup> *See* AT&T/WorldCom Ex. 12, at 20.



unspecified security concerns nor Verizon's failure to develop OSS supports the need for UDLC loops. Although we resolve the DLC type issue in the recurring cost section, the actual impact on the recurring loop costs is relatively small. The effect of the DLC choice is potentially much greater on non-recurring costs because that is how Verizon proposes to recover the costs of unbundling NGDLC loops. Because we resolve non-recurring DLC cost issues based on the parties' interconnection agreements, however, we do not perform a detailed analysis of the effect on NRCs of our DLC type finding.<sup>809</sup>

**(a) GR-303 NGDLC v. TR-008 IDLC**

311. First, we find that, as between TR-008 IDLC systems and NGDLC systems, the MSM should use NGDLC systems. AT&T/WorldCom are correct that NGDLC systems are newer and more advanced than TR-008 IDLC systems. The main reason that Verizon assumes a majority of outside plant would use TR-008 IDLC systems is that Verizon's existing switches and DLC systems are designed to support TR-008 interfaces but would require upgrading or replacement to support GR-303 interfaces.<sup>810</sup> Existing Verizon switches and DLC systems, however, are not the appropriate basis for a TELRIC analysis, which is not constrained by the technical limitations of Verizon's embedded plant. When such constraints are removed, Verizon admits that more than ten percent NGDLC systems would be appropriate.<sup>811</sup> We note, moreover, that in the context of the loop plant costs, Verizon admits that no significant cost difference exists between TR-008 IDLC systems and NGDLC systems.<sup>812</sup> Thus, because NGDLC systems are more advanced and efficient than TR-008 IDLC systems, we will use NGDLC costs, and not TR-008 IDLC costs, to calculate loop costs.

**(b) GR-303 NGDLC v. UDLC**

312. The issue remains, however, whether investments for UDLC equipment should be included in the cost model or whether we should assume the use of 100 percent NGDLC equipment. Thus, we must decide whether, of the percentage of loops that traverse DLC systems, the breakdown should be (1) 100 percent NGDLC or (2) 70 percent NGDLC and 30 percent UDLC. For the reasons set forth in the following subsections, we agree with AT&T/WorldCom that a TELRIC model should use 100 percent NGDLC systems and should not assume any UDLC systems.

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<sup>809</sup> See *infra* section X(C)(5).

<sup>810</sup> See AT&T/WorldCom Reply Cost Brief at 57.

<sup>811</sup> Tr. at 4554-56 (in response to questions from Commission staff on the ratio between TR-008 IDLC and GR-303 NGDLC assuming a scorched node pricing approach, Verizon witness Gansert responded as follows: "If you were hypothesizing that all constraints [of the existing Verizon network] disappear somehow, then you would certainly use more GR303. I don't think it would be a hundred percent—of the IDLC. . . . you would have a higher percentage of GR303. I'm not sure. I would have to look at it to understand what it was. I think we would need to look at some numbers to figure it out.").

<sup>812</sup> *Id.* at 4159, 4529-31.

(i) **Burden of Proof**

313. The Commission's rules place the burden of proof on Verizon to demonstrate that a method of accessing UNEs is not technically feasible. Rule 51.321(d) requires that the incumbent LEC "*must prove* to the state commission that the requested method of obtaining interconnection or access to network elements . . . is not technically feasible."<sup>813</sup> In the *Non-Cost Arbitration Order*, the Bureau relied on this rule to reject Verizon's proposal to require that the bona fide request process be used to obtain access to UNEs other than through collocation. Specifically, the Bureau found:

The Commission's rule 51.321(d) expressly provides that an incumbent that denies a competitor's request for a particular method of obtaining access to UNEs must demonstrate to the state commission that the requested method of obtaining such access is not technically feasible.<sup>814</sup>

314. Here, Verizon essentially argues that it is not feasible to provide unbundled access to NGDLC loops.<sup>815</sup> Verizon, therefore, bears the burden to prove this claim. As explained below, Verizon fails to demonstrate that NGDLC unbundling is not currently available. Thus, Verizon fails to satisfy its burden of proof.

(ii) **Technical Feasibility / Current Availability**

(a) **Verizon Non-Cost Testimony**

315. We find that the record demonstrates that it is technically feasible to unbundle NGDLC loops, and that this technology is currently available. Although both sides introduced voluminous record evidence in the cost portion of the arbitration,<sup>816</sup> the evidence is conflicting and ultimately unsatisfying. The most revealing information on this issue comes from Verizon's testimony in the non-cost portion of the arbitration. There, a Verizon witness admitted that

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<sup>813</sup> 47 C.F.R. § 51.321(d) (emphasis added).

<sup>814</sup> *Non-Cost Arbitration Order*, 17 FCC Rcd at 27208, para. 353.

<sup>815</sup> See AT&T/WorldCom Reply Cost Brief at 55.

<sup>816</sup> See AT&T/WorldCom Ex. 12, at 19-30; AT&T Ex. 120 (NYNEX Technical Document, Unbundling Loops in TSI (Time Slot Interchanger) Equipped Digital Loop Carrier Systems (1997)); AT&T Ex. 121 (Bell Atlantic Fundamental Planning, Guideline FP-G-97-005, Issue No. 1 (1997)); AT&T Ex. 122; AT&T Ex. 123 (Time Slot Interchange Applications in Remote Digital Terminals); AT&T Ex. 124 (NYNEX Technical Document Library, Loop Technologies Application Guidelines); WorldCom Ex. 116 (US West Communications Inc., GR-303 Deployment and Loop Unbundling (1998)); WorldCom Ex. 117 (SBC, GR-303 Deployment Issues – An ILEC Perspective (1998)); WorldCom Ex. 118 (Bell Atlantic, Loop Unbundling with a GR-303 Platform, Bellcore GR-303 Integrated Access Symposium (1998)); WorldCom Ex. 119P; WorldCom Ex. 120P; Verizon Ex. 107, at 24-26, 95-100; Verizon Ex. 122, at 76-85; Tr. 4069-92, 4146-89, 4528-33, 4554-58, 4575-91, 4608-19.

Verizon has had the technical ability to provide unbundled NGDLC loops for *four to five years* but chose not to implement a standard offering because competitive carriers had not sufficiently pursued such an offering.<sup>817</sup> Further, this same witness admitted that migrating from an NGDLC loop to a UDLC loop within the Litespan NGDLC system can occur automatically.<sup>818</sup> Indeed, in analyzing this testimony in the *Non-Cost Arbitration Order*, the Bureau found that “Verizon’s expert testified that the assignment process, by which Verizon would assign an IDLC loop to either a UDLC or copper loop, *can be mechanized*.”<sup>819</sup>

#### (b) Providing Special Services over NGDLC Lines

316. As noted above, Verizon contends that the existence of certain non-switched special access services, such as private lines, requires that almost 25 percent of the outside plant traverse UDLC systems. AT&T/WorldCom disagree, claiming that Verizon’s own planning guidelines show that UDLC is not necessary to provision special access services.<sup>820</sup>

317. We agree with AT&T/WorldCom. Verizon may need to continue to deploy UDLC systems in its embedded network in Virginia because certain special access lines cannot be provided using TR-008 IDLC systems without incurring significant expenses. According to Verizon’s own internal documents, however, these limitations do not restrict network design decisions in Verizon West (former GTE territory).<sup>821</sup> Thus, Verizon’s own network implementation in its western territories supports the finding that UDLC systems are no longer necessary to provide non-switched special services.

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<sup>817</sup> Tr. at 276-78, 292-93.

<sup>818</sup> *Id.* at 277-78.

<sup>819</sup> *Non-Cost Arbitration Order*, 17 FCC Rcd at 27319, para. 578 (emphasis added). We also note (and take administrative notice) that BellSouth, in its section 271 applications, repeatedly informed the Commission that it unbundles loops that traverse NGDLC and GR-303 IDLC systems, thereby demonstrating that such unbundling is technically feasible and currently available. See, e.g., *Joint Application by BellSouth Corporation, BellSouth Telecommunications, Inc., and BellSouth Long Distance, Inc. for Provision of In-Region, InterLATA Services in Georgia and Louisiana*, CC Docket No. 01-227, Affidavit of Keith Milner at para. 118 (filed Oct. 2, 2001) (BellSouth GA/LA Milner Affidavit); *Joint Application by BellSouth Corporation, BellSouth Telecommunications, Inc., and BellSouth Long Distance, Inc. for Provision of In-Region, InterLATA Services in Florida and Tennessee*, CC Docket No. 02-307, Affidavit of Keith Milner at para. 99 (filed Sept. 20, 2002) (BellSouth FL/TN Milner Affidavit). We further note that it is not clear that all of the costs associated with BellSouth’s multiple methods of unbundling NGDLC loops are included in the MSM. Verizon, however, does not acknowledge that these methods of unbundling are occurring today, let alone provide any evidence that AT&T/WorldCom fail to include specific costs associated with such unbundling in their proposal.

<sup>820</sup> AT&T/WorldCom Initial Cost Brief Proprietary at 135-36 (citing WorldCom Ex. 119P) (confidential version); AT&T/WorldCom Reply Cost Brief at 55.

<sup>821</sup> WorldCom Ex. 120P, at 3, 5, 12 (confidential version); Tr. at 4188 (Verizon conceding that growth in Verizon West is based on GR-303 NGDLC systems).

318. Further, even were UDLC systems necessary, Verizon fails to demonstrate that they would be necessary for a quarter of all loops. Verizon does not identify with specificity which types of non-switched special access lines it contends require the use of UDLC. Verizon identifies neither DS-3 nor DS-1 services but rather provides descriptions akin to private line services.<sup>822</sup> Thus, Verizon appears to be referring to voice and 64 kbps data special services only.<sup>823</sup> Although the Commission lacks data on the demand for special services, exclusive of other special access services (e.g., DS-3s, DS-1s), Verizon's claim that one-fourth of its network requires UDLC systems strains credulity. Indeed, during the hearing, Verizon testified that approximately ten percent of its network consists of non-switched services.<sup>824</sup> When DS-3s and DS-1s (and perhaps other special access services) are excluded from this figure, the remaining lines would constitute only a fraction of this figure, perhaps even a negligible amount.

### (c) Network Security and OSS

319. As noted above, Verizon claims that GR-303 NGDLC unbundling is not yet available because network security concerns and OSS implementation issues have yet to be resolved. AT&T/WorldCom disagree, contending that security issues, which Verizon fails sufficiently to explain, are eminently solvable, and that OSS issues are of the same variety previously overcome by Verizon in originally developing OSS for UNEs.<sup>825</sup> We disagree with Verizon that either security concerns or OSS issues warrant a finding that UDLC systems are required in the forward-looking, TELRIC-compliant network.

320. Experience with deployment of NGDLC systems in Verizon West territories directly undermines Verizon's position. Specifically, during the hearing Verizon admitted that GR-303 systems are used for growth throughout Verizon West territories.<sup>826</sup> Although Verizon claims that there are network security reasons not to deploy GR-303 NGDLC systems in Virginia, Verizon admits that its deployment guidelines for Verizon West territories remain in effect despite these concerns.<sup>827</sup> If Verizon has overcome its security concerns in its western territories, we see no reason (and no specific evidence is before us) that it cannot do so in Virginia. Thus, allegations of unspecified security concerns fail to show that NGDLC systems

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<sup>822</sup> See Verizon Ex. 122, at 97.

<sup>823</sup> If Verizon is referring to DS-3 or DS-1 special access services, we note that we have excluded such lines from our calculation of the 2-wire loop costs. See *supra* section IV(C)(2)(b)(ii). UDLC systems thus would be unnecessary.

<sup>824</sup> See Tr. at 4160; Verizon Initial Cost Brief at 89. Verizon's statement that non-switched services comprise ten percent of its network is less than clear. A network is comprised of facilities, not services, and many of these facilities (e.g., DLC systems) are shared among multiple services. Nevertheless, Verizon's claim appears inconsistent with its position that a quarter of its network must use UDLC to support non-switched services.

<sup>825</sup> See AT&T/WorldCom Ex. 12, at 29-30; Tr. 4615; AT&T/WorldCom Initial Cost Brief at 138-40.

<sup>826</sup> Tr. at 4188; see WorldCom Ex. 120P, at 3, 5, 12 (confidential version).

<sup>827</sup> See Tr. at 4165-68.

are not currently available.<sup>828</sup>

321. In addition, Verizon's lack of OSS to support NGDLC loop unbundling does not warrant a finding that loops that traverse these systems cannot be unbundled. Developing and implementing such systems is within Verizon's control.<sup>829</sup> The relevant inquiry is not whether Verizon has developed and deployed these systems, but whether the technology is "currently available."<sup>830</sup> In the *Local Competition First Report and Order*, the Commission recognized that, "although *technically feasible*, providing nondiscriminatory access to [OSS] functions may require *some modifications to existing systems*," but it nonetheless required incumbent LECs to provide such access.<sup>831</sup> Requiring Verizon to implement OSS to support NGDLC is beyond the scope of this order. Nevertheless, we rely on the Commission's reasoning in the *Local Competition First Report and Order* to reject Verizon's claim that its lack of OSS demonstrates that NGDLC loop unbundling is not technically feasible or currently available.<sup>832</sup>

322. Accordingly, because it is technically feasible to unbundle loops that traverse NGDLC systems and because the technology to do so is currently available, we will use AT&T/WorldCom's proposal of 100 percent NGDLC in our determination of loop rates.

## I. Digital Loop Carrier Investments

### (i) Introduction

323. Having determined that we will use 100 percent NGDLC systems where the MSM models fiber-based feeder plant, we now determine the appropriate NGDLC investment inputs.

### (ii) Positions of the Parties

324. AT&T/WorldCom propose DLC investment inputs different from those the Commission uses in the SM. Specifically, AT&T/WorldCom propose: (1) higher line card costs; (2) lower common system costs; and (3) lower site preparation costs.<sup>833</sup> First, AT&T/WorldCom

<sup>828</sup> We also note that BellSouth, in its section 271 applications, indicated that it uses multiple methods to unbundle loops that traverse GR-303 IDLC systems and NGDLC systems. See, e.g., BellSouth GA/LA Milner Affidavit at para. 118; BellSouth FL/TN Milner Affidavit at para. 99.

<sup>829</sup> See AT&T/WorldCom Ex. 12, at 29.

<sup>830</sup> 47 C.F.R. § 51.505(b)(1).

<sup>831</sup> See *Local Competition First Report and Order*, 11 FCC Rcd at 15767-68, paras. 524-525 (emphasis added).

<sup>832</sup> See AT&T/WorldCom Reply Cost Brief at 55-56. We also note that BellSouth, in its section 271 applications, indicated that it can and does provision loops that originally traverse GR-303 IDLC systems and NGDLC systems to competitive LECs. See, e.g., BellSouth GA/LA Milner Affidavit at para. 118; BellSouth FL/TN Milner Affidavit at para. 99. This shows the existence and availability of OSS (whether manual or automated) capable of performing the ordering, provisioning, billing and other functions necessary for an incumbent LEC to provision such loops.

<sup>833</sup> AT&T/WorldCom Ex. 6, at 13-36.

propose higher input rates for DLC line cards based on the research of one of their witnesses.<sup>834</sup> Second, they exclude DLC line card costs from DLC common costs, claiming that the SM improperly included line card costs both in the common costs and in the stand-alone inputs.<sup>835</sup> Third, they propose site preparation cost inputs of \$3,000 for high-density systems and \$1,300 for low-density systems, instead of the \$11,000 used in the SM for all systems.<sup>836</sup> Also, as the Commission did in adopting the SM,<sup>837</sup> AT&T/WorldCom assume that DLC investment costs are for NGDLC systems.<sup>838</sup> These cost inputs are based on the individual experiences of an AT&T/WorldCom witness, as well as the opinions of AT&T/WorldCom engineers and other experts who designed the HAI cost model.<sup>839</sup> AT&T/WorldCom also claim that the DLC inputs they propose are consistent with, or even higher than, those in Verizon's actual contract for Alcatel Litespan DLC equipment.<sup>840</sup>

325. Verizon challenges AT&T/WorldCom's proposed DLC investment inputs, claiming that they are based on the unsubstantiated opinions of one of AT&T/WorldCom's witnesses. Therefore, according to Verizon, they represent the same sort of groundless inputs that the Commission refused to countenance in the *Inputs Order*.<sup>841</sup> Verizon also argues that AT&T/WorldCom's use of Verizon's Litespan contracts is misplaced because the MSM inputs already include costs for engineering, furnishing and installation (*e.g.*, labor), whereas the Litespan contracts are materials-only contracts that do not include costs for any of these categories of activities.<sup>842</sup> Verizon does not propose a corrected input for use in the MSM.

### (iii) Discussion

326. We agree with Verizon's criticisms of the new AT&T/WorldCom DLC investment inputs, and we therefore adopt, for purposes of this proceeding, the unmodified SM DLC investment inputs. First, Verizon correctly states that AT&T/WorldCom's proposed inputs rely solely on the unsubstantiated opinions of one of their witnesses, precisely the sort of data that the Commission rejected as an inappropriate basis for determining DLC investment inputs in the *Inputs Order*.<sup>843</sup>

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<sup>834</sup> *Id.* at 13-15.

<sup>835</sup> *Id.* at 15-18, 32-33.

<sup>836</sup> *Id.* at 33-36.

<sup>837</sup> *See Inputs Order*, 14 FCC Rcd at 20276-77, para. 280 n.593.

<sup>838</sup> AT&T/WorldCom Ex. 6, at 19-20.

<sup>839</sup> *Id.* at 18; *see also* AT&T/WorldCom Reply Cost Brief at 58.

<sup>840</sup> AT&T/WorldCom Ex. 18, at 13-14; *see also* AT&T/WorldCom Reply Cost Brief at 58.

<sup>841</sup> Verizon Ex. 109, at 110-11; Verizon Initial Cost Brief at 162-63; Verizon Reply Cost Brief at 154-55.

<sup>842</sup> Verizon Reply Cost Brief at 155.

<sup>843</sup> *See Inputs Order*, 14 FCC Rcd at 20276, para. 281.

Second, Verizon is correct that its Litespan contract serves as an inappropriate point of comparison because the MSM inputs already include installation costs, whereas the Verizon contract with Litespan is a materials-only contract.<sup>844</sup> If the DLC Engineer, Furnish & Install (EF&I) factor reflected in Verizon's LCAM<sup>845</sup> were applied to the Litespan contract, the contract would generate DLC investment inputs significantly higher than those proposed by AT&T/WorldCom.

327. In addition, AT&T/WorldCom incorrectly assert that the Commission misunderstood their claim regarding the inclusion of DLC line card costs in the DLC investment calculations. To the contrary, the Commission comprehended AT&T/WorldCom's claim in the universal service proceeding that the SM double counted line cards by including them as both an individual line item and as part of DLC common costs. The Commission rejected this claim and found instead that DLC line equipment costs should be included in the DLC common costs.<sup>846</sup> We reject the identical argument here.

328. Although we reject AT&T/WorldCom's proposed NGDLC investment inputs, Verizon fails to proffer any specific alternative inputs for use in the MSM. We, therefore, have no alternative but to revert to the SM NGDLC investment inputs.<sup>847</sup>

**m. Virginia Service Standards**

**(i) Positions of the Parties**

329. Verizon claims that the network modeled by the MSM would not enable Verizon to comply with the Virginia Commission's service quality standards.<sup>848</sup>

330. AT&T/WorldCom claim that the Commission, in designing the SM, expressly designed a cost model that reflects the forward-looking costs of providing service.<sup>849</sup>

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<sup>844</sup> See Verizon Reply Cost Brief at 155.

<sup>845</sup> We take no position on the appropriateness of the EF&I factor. Rather, we use it here for comparative purposes only.

<sup>846</sup> See *Inputs Order*, 14 FCC Rcd at 20275, para. 278.

<sup>847</sup> We note that using the DLC investment inputs from the SM may overstate costs. In the *Inputs Order*, the Commission relied on DLC contract data from non-rural LECs from 1995 to 1998. See *Inputs Order*, 14 FCC Rcd at 20275, para. 272. The Commission then adjusted these data to account for the declining costs of DLC systems, applying a "conservative" annualized downward adjustment of 2.6 percent to derive 1999 investment data. See *id.* at 20276-77, paras. 282-84. To the extent that DLC costs have continued to decline since 1999, but we continue to use the 1999 inputs, we would be overstating DLC costs.

<sup>848</sup> Verizon Ex. 109, at 25; Verizon Initial Cost Brief at 149.

<sup>849</sup> AT&T/WorldCom Initial Cost Brief at 37-39.

(ii) Discussion

331. We agree with AT&T/WorldCom and reject Verizon's claim. Verizon offers no specific evidence that the network modeled by the MSM would not be capable of providing service at quality levels required by the Virginia Commission.<sup>850</sup> Rather, Verizon merely presents unsubstantiated speculation. Such speculation fails to undermine the affirmative conclusion reached by the Commission in adopting the original SM that the model enables "the user to estimate the cost of building a telephone network."<sup>851</sup> Inasmuch as the Commission previously determined that the SM, on which the MSM is based, designs a network sufficient to provide service to Virginia consumers, we decline to find otherwise here.

**D. Loop Types Not Directly Modeled by the MSM**

**1. 4-Wire, DS-1, and DS-3 Loop Types**

**a. Introduction**

332. The MSM generates costs, and therefore rates, for the basic 2-wire loop only. AT&T/WorldCom propose to apply out-of-model computations to the basic 2-wire loop costs generated by the MSM to determine rates for 4-wire, DS-1, and DS-3 loops.<sup>852</sup> AT&T/WorldCom propose different out-of-model calculations to determine the 4-wire loop rate than they use to determine the DS-1 and DS-3 loop rates.<sup>853</sup>

333. Verizon criticizes the out-of-model calculations that AT&T/WorldCom use to generate rates for 4-wire, DS-1, and DS-3 loop types.<sup>854</sup> It challenges the individual adjustments made for each of these loop types, and it criticizes AT&T/WorldCom for using calculations to determine the 4-wire loop rate different from the calculations they use to determine the DS-1 and DS-3 loop rates.<sup>855</sup> Verizon also criticizes AT&T/WorldCom for failing to propose geographically deaveraged rates for the 4-wire and DS-1 loop types.<sup>856</sup>

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<sup>850</sup> See Verizon Ex. 109, at 25; Verizon Initial Cost Brief at 149.

<sup>851</sup> *Inputs Order*, 14 FCC Rcd at 20166-67, para. 17; *Platform Order*, 13 FCC Rcd at 21325, 21336, 21348, paras. 4, 29, 60.

<sup>852</sup> AT&T/WorldCom Ex. 1, at 23-26; AT&T/WorldCom Ex. 23, Vol. 1 at 10-12, Attach. J; see also AT&T/WorldCom Initial Cost Brief at 167.

<sup>853</sup> Compare AT&T/WorldCom Ex. 1, at 23-24, with AT&T/WorldCom Ex. 1, at 25-26.

<sup>854</sup> Verizon Ex. 109, at 38-43; Verizon Reply Cost Brief at 139-40, 145.

<sup>855</sup> Verizon Ex. 109, at 39; Verizon Reply Cost Brief at 145.

<sup>856</sup> Verizon Ex. 109, at 42.